CONTROLLED BURNING IN WESTERN AUSTRALIAN FOREST PRACTICE

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In the seventeenth century records of fires burning on the mainland of Western Australia are to be found in the logs of the early seafarers - Pelsart, Vlaming, Jonck and Volkerfen.

It is known that the aboriginals in the South-West were acquainted with the use of fire and also that they moved continually throughout the forest area, rarely staying more than a few days in any one place. These nomadic tendencies were induced by the continual search for food and for this reason also they did not move as tribes, but as small groups or family units. It is, therefore, evident that there must have been hundreds of cooking fires burning within the forest on every day of the year. Add to this the constant movement of the population (each unit of which carried one or more fire sticks) and sound evidence that fires were used in hunting, and it becomes inconceivable that accidental fires did not occur.

As many as 34 lightning fires have been recorded during one season in recent years and up to 28 on one day and fires from this source must have occurred with the same intensity long before the era of white settlement.

There seems little doubt, therefore, that the forests of this country have been subjected to uncontrolled fires over many centuries.

In view of the great number of fires which must have been present throughout the whole summer season it is reasonable to assume that vast areas of the forest were burnt over each year. Possibly the whole area was covered every 3 - 5 years.

The original forest was characterised by massive mature and overmature trees, with only small groups of the intermediate population. Reaching co-dominant heights of 90 to 130 feet in the jarrah and 180 to 250 feet in the karri forest, the crowns were high above any fire damage level from fires running through the relatively light litter and a ground cover of sparsely leaved shrubs.

There is every reason to believe the statements of early settlers that it would have been possible to gallop a cavalry regiment through the virgin forest and the writers have seen similar areas of virgin jarrah forest even as late as 20 years ago.

Under these conditions over many centuries, the forests of the south-west developed to their various climax types. The ability of jarrah in particular to withstand fire has placed it as one of the most resistant species of the genus.

Chronodendrological studies have indicated that there was virtually no damage to the tree boles over several centuries and most of this type of defect is seen within the last hundred years of growth.

Since the advent of white settlement in 1829 the forests were progressively subjected to uncontrolled exploitation and this resulted in the accumulation of masses of debris left after felling operations. There was no orderly disposal of these masses of fuel and the result was fires of increasing severity over greater and greater areas. This was a violent contrast to the light periodic fires of past centuries. At the same time, the opening of the closed canopy of the virgin stand produced a considerably heavier growth of ground flora and a marked increase in the understorey trees (Banksia, Casuarina, etc.) which assumed the character of weed growth in the openings. The fuel near the ground was thus increased and had the effect of taking uncontrolled fires into the canopy level. This led to severe crown damage not only in the cut over areas, but in the adjacent virgin forest which was swept by these heavier fires. Damaged crowns slowed down growth and competition for the site and, together with the greater incidence of sunlight at the ground level, further increased the density of ground flora and understorey trees. Bole damage became excessive and badly scarred trees and hollow butts are mute reminders of past maltreatment.

This frequently repeated cycle led to serious damage and devastation of the forest during the 90 years prior to the passing of the Forest Act in 1918. The appalling state of some of the forest is indicated by photographs, included herein, taken in prime jarrah forest in the Dwellingup Division almost 40 years ago.

There is little wonder then that the early foresters, true to their teachings and struck with horror at such appalling sights, decided that the only way to repai

the damage and establish a healthy, vigorous and enduring crop was by complete protection of the forest as it was brought under management.

It should be remembered that there was virtually no forest area at that time which carried more than 5 years' leaf litter and the greater part varied from 1 to 3 years. It appeared that virgin forest did not accumulate litter to any marked extent and subsequent accumulations of litter and scrub in protected compartments could not have been envisaged.

Policy at this time required a light advance burn immediately ahead of logging, with a following treatment for disposal of the tops of the felled trees. This consisted of the lopping of limbs so that they lay flat on the ground and clearing around the butts of the remaining useful growing stock. The debris was then burned by a controlled fire in the cooler part of the spring or autumn.

Complete protection was then afforded the greater part of the cut over areas by provision of fire break strips, burnt every three years, around protected compartments.

Originally, compartments were not more than 500 acres and each was surrounded by a "scraper" track which defined a firebreak of approximately 5 chains width. The scraper was formed from a piece of railway rail bent to an acute angle and having a cutting blade attached. This equipment could be pulled by one horse and left a clear trail about 2'6" in width.

Strict adherence to this prescription did much to reduce, in size and number, the disastrous fires of previous decades. Over a period, however, it became apparent that this schedule was silviculturally undesirable in that the final burn before protection did not at times coincide with a seed year. This became particularly noticeable in the karri forest and in recent years the final burn before commencing a period of complete protection has been made to coincide with suitable seed supplies ready to fall from the trees.

For several years in the light litter then prevailing in the forests the scraper track formed a useful fire line to confine the burning of the 5 chain breaks around the 500 acre compartments. Eventually, with the expansion of protection and the gradual change from horses and bicycles to motor transport and the evolution of the

light utility gang truck, it was found that scraper tracks which could be negotiated only on foot were becoming too slow. Furthermore, it became apparent that it was not possible to cope with the amount of burning required and the firebreak system, of necessity, had to be expanded to enclose areas of up to 1500 acres.

Scraper tracks at this time gave way to trafficable firelines along which a motor vehicle could move at slow speed.

Management was rapidly expanded and, by 1950 1.2 million acres were under intense protection. The motor vehicle fleet had extended from 3 in 1929 to 147 in 1949 and the general road system had been greatly improved and extended from 1093 m. to 12,000 m. over the same period. Even greater progress was made during the following decade and, by 1959, 3.3 million acres had been brought under protection.

During this period it had slowly become apparent that the controlled burning operations were becoming more and more difficult and expensive. The number of miles of firebreak to be burnt on a 3 year rotation was of the order of 240 miles in each division and this meant 40 - 50 miles per gang. As the burning days for firebreaks adjacent to long protected firebreaks amounted to less than 30 in any one year it will be seen that with other forms of protection (advance burns, top disposal and broadcast burning in protection forests) the task of burning breaks was almost beyond the capacity of the works force.

By this time the condition of the protected compartments had reached the stage where there was an accumulation of 6 - 7 tons per acre of fine fuel and a marked increase of scrub growth which held the leaf-fall within its branchlets, while the fine highly inflammable outer bark of the jarrah covered every tree. Add to this that in the early decade of regeneration treatment over 300,000 acres had been heavily ringbarked, and the inflammability picture is complete.

Apart from the physical difficulty of burning long lengths of firebreak, and in spite of every precaution taken, consistent trouble was being experienced with "hopovers" into the protected compartment on the other side of the fireline. The net result was a gentle controlled burn on the break and then, suddenly, a fire in the heavy litter of the protected area. This required the break burn to be sealed off - all hands to the compartment fire and frequently the calling in of other

gangs to assist. The effect was a loss of valuable break burning time by a number of men until the wildfire was completely controlled.

This situation developed gradually but was becoming so serious by 1950 that it was impossible to maintain the prescribed break burning schedule and not only was litter steadily accumulating in the compartments but was starting to build up on the firebreaks themselves. In turn this made burning of the breaks even more difficult and hazardous. The position had then been reached that on every day that a gang was sent out burning firebreaks it was with the fear that there could be an uncontrolled fire raging at nightfall. Morale of both staff and men was deteriorating.

The position generally was emphasised by the serious fires of 1949 and 1950.

During the previous decade and particularly after World War II the tendency had been to introduce more and heavier equipment but although this helped to a marked degree it did not solve the problem. In fact, firefighting personnel tended to become too power-pumper conscious and were inclined to sit back without making much attempt to tackle the fire while waiting for power units to arrive. This misplaced confidence crept in over a period and it has taken some years to re-establish the fact that fires are put out and held almost entirely by man power and physical endeavour and that heavy equipment such as power pumpers, aqua tracks, bulldozers, etc., while forming a valuable aid to the firefighting force is not the ultimate means of fire suppression.

The question of financing the policy of complete protection was also becoming serious. It was evident that continually increasing demands for equipment and costs of firebreak burning up to £40 per mile, could no longer be supported within the Department's economy, particularly as the prescribed break burning and protection policy was not being maintained in spite of these rapidly increasing costs.

Other aspects of the situation were reviewed. Analyses had proved that there was no chemical alteration of the forest soils under conditions of frequent light fires. Measurements of growth rates over a period of years showed virtually no difference between long-protected areas and regularly burnt firebreaks.

The growth on the firebreaks looked as good, if

not better, than the protected compartments.

There was some indication that the insect population was increasing although, through lack of data, this could not be proved.

In future periods of dangerous weather, more serious wildfires with their attendant heavy damage appeared certain. On the other hand it was felt that areas of dense regrowth along the older bush tramlines had developed not "in spite of" but "because of" the regular light burning along these lines caused by the many passing locomotives in the days before the enforcement of efficient spark arresters.

Late in 1953, a policy of prescribed controlled burning was introduced. This change envisaged the continuance of advance burning before utilisation and top disposal after this operation, but made further provision for widespread controlled burning by compartments in an endeavour to reduce the fuel accumulation throughout the forest - particularly in the long protected areas. Decisions on weather control of the burning were left to the discretion of officers in charge of divisions who were required to carry out this operation with the minimum of damage to existing stands.

A check was made of the regrowth situation in each Division and in certain areas prescriptions required complete protection over a period of years until regrowth had grown above the fire damage line - 20 feet.

Plans were drawn up showing zones of burning composed of broad strips of compartments throughout the forests and specific attention was paid to external boundaries adjoining private property on the north and west from which the main danger could be expected.

Progress in the first few years was slow and it was found that long protected compartments could be burnt with safety only on days of light wind when the temperature was below 60° and the relative humidity above 50%, or at night - in many cases three separate burns were necessary over an area before the fuel could be suitably reduced.

Various methods of burning which had been under experimentation over the years were tried out under many conditions of fuel, topography and weather.

It was found that no set method could be laid down for all conditions and the actual method in any specific area had to be decided upon by the local Officer.

The instructions for any burn may vary from burning across and with the wind in fine spells in winter; spotting into the wind with firm distances between lines or between spots; burning parallel with a ridge commencing at the top and working the lines downhill; burning at night; and many other methods to suit local conditions and circumstances.

All methods are available to the officer in charge of the operation and constant attention to weather, fuel state and topography with regular inspection of results under different methods is essential if the field officer is to become efficient at this type of work.

A general review of the position and comparison of the five years before and after 1953, allowing for changes in money values, indicates the following trends :-

1. The total expenditure on fire protection remains much the same, while the area of forest brought under management and protection is steadily increasing.

2. A small increase in cost of controlled burning has brought the annual coverage up to the order of 400,000 acres - almost three times the figure for the earlier period.

3. There has been little reduction in the total number of fires occurring.

4. The area covered by uncontrolled fires has been reduced considerably and the intensity of individual fires, and consequent damage to the forest, has been minimised.

5. Costs of firefighting have been reduced to almost half of the earlier period.

6. The rural communities feel safer and support the policy of regular burning.

7. In some districts there has been a decrease in incendiarism.

With the above there has been a marked increase in the morale of both staff and employees and a reawakened interest in controlled burning and firefighting techniques.

This is a very welcome trend for even if the

present area of controlled burning can be increased, the position will be that the forest area will range in fuel density from one to ten years. Serious fires can still occur in leaf litter of over five years, but with a burning programme well planned to cover a period of several years ahead it should be possible to control any fire within reasonable time and area. At present some 65% of our fires are under 10 acres in extent. This figure can and will be improved. To achieve this the whole organisation must be constantly on the alert, equipment ever ready and the firefighting personnel trained to the utmost to attack wildfires early and hit them hard.
